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Biological evaluation ...
Mountain Pine Beetle State of
Wyoming

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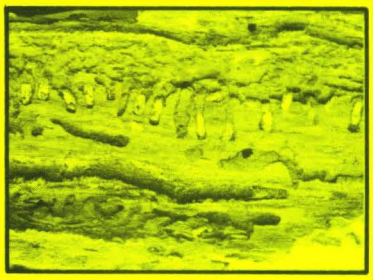
INTERMOUNTAIN REGION



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BIOLOGICAL EVALUATION
MOUNTAIN PINE BEETLE
STATE OF WYOMING
LANDS ADJACENT TO BRIDGER-TETON NATIONAL FOREST
1978

FOREST INSECT AND DISEASE MANAGEMENT
STATE AND PRIVATE FORESTRY
U.S. FOREST SERVICE
OGDEN, UTAH

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INTRODUCTION

The present mountain pine beetle infestation on the Bridger Division of the Bridger-Teton National Forest (formerly Bridger National Forest) began building in the mid- to late 1960's in the area surrounding New Fork and Fremont Lakes. This epidemic peaked on that portion of the Forest in 1970 and since that time has moved throughout the lodgepole pine type along the front range of the Wind River Mountains in generally a southeasterly direction. Annual aerial detection surveys indicate that at the present time what remains of the infestation is concentrated in a 20-mile strip which runs from about 3 miles west of the Dutch Joe Guard Station (12 miles east of Big Sandy, Wyoming) to 5 miles east of the Sweetwater Guard Station. Beetle populations began a rapid buildup in this area in 1974, with maximum tree killing occurring in 1975 and 1976. While some mortality is still occurring, the infestation is definitely subsiding. Aerial and subsequent ground surveys show the beetles have killed most of the large-diameter lodgepole pine at lower elevations along the front range of the mountains and are now moving into the small-diameter stands at higher elevations. These stands are not conducive to good brood production; therefore, beetle populations will continue to decline for the next several years.

GENERAL INFORMATION

Insect: Mountain pine beetle, Dendroctonus ponderosae Hopkins.

Host Tree: Lodgepole pine, Pinus contorta Dougl.

Type of Damage: Tree-killing.

Location: Section 16, T31N, R105W and South $\frac{1}{2}$, Section 36, T31N, R105W. Nine hundred and sixty acres belonging to the State of Wyoming adjacent to the Bridger-Teton National Forest west of the Dutch Joe Guard Station (Figure 1).

Extent of Outbreak: Maximum tree killing occurred in these areas about three years ago. Many standing dead lodgepole remain, but the beetle exists at a low endemic level only.

METHODS

At the request of the Wyoming State Forester, District Forester Bart Trucano from the Wyoming State Division of Forestry in Evanston, and Ken Gibson, Entomologist, Forest Insect and Disease Management in Ogden, Utah, conducted evaluation surveys to determine the infestation level of the mountain pine beetle on the state-owned land described previously. The areas were surveyed in a systematic manner with $\frac{1}{2}$-acre strip plots ($\frac{1}{2}$-chain wide by 10 chains long) being laid out along north-south transects through the two Sections. Section 16 was surveyed on July 11 and the South $\frac{1}{2}$ of Section 36 on July 12. Mountain pine beetle mortality was recorded in one of four categories: new attacks (1978), old attacks (1977), snags (dead trees killed in 1976 and before) and strip attacks (1978 and 1977 only). At the 10-chain (end) point of each strip plot, a variable radius (BAF 10) plot was established. From this plot live tree data was taken which was used to construct green stand structure tables.

Of the 640 acres in Section 16, only about 400 acres are lodgepole pine type. The remainder is either quaking aspen, sagebrush meadows, or ponds. On four transect lines, 16 plots were established within the lodgepole forested area. On the South $\frac{1}{2}$ of Section 36, of 320 acres approximately 75% is lodgepole pine type with aspen and Engelmann spruce comprising the other 25%. Here 10 plots were established on four transects.

RESULTS

Tables 1 through 4 show mountain pine beetle mortality on Section 16 (Irish Canyon Creek); green stand data on Section 16; beetle mortality on $S\frac{1}{2}$, Sec. 36 (Muddy Ridge); and green stand data $S\frac{1}{2}$, Sec. 36; respectively. Though much standing dead lodgepole remains in both stands, current beetle activity is at a very low level. On the Irish Canyon Creek Section, four new (1978) hits were found; two of these were in a stand of small-diameter trees and in association with Ips beetles. In such a situation, it is unlikely that much brood will be produced. On the other Section, Muddy Ridge, no new (1978) or old (1977) attacks were found at all. Green stand structure data suggests some large-diameter green trees remain in the stands, particularly Irish Canyon Creek. But with the population of the beetles being at such a low level, these trees will probably not be threatened in the near future.

DISCUSSION

Annual aerial detection survey data indicate that throughout the current infestation, beetle populations never reached what is

considered epidemic proportions; i.e., more than one tree/acre/year being killed on either of the two Sections. In 1966, the first year that mortality was recorded on the Irish Canyon Creek Section, 0.10 trees/acre were killed. The figure rose to 0.50 in 1971 and peaked at 0.63 in 1976. Last year the number had again fallen to 0.10. On the Muddy Ridge Section, the high figure was 0.31 trees/acre in 1970. None were observed last year.

Two additional factors are contributing to low beetle numbers. First, a high percentage of the large trees have been killed which has effectively reduced the average stand diameter to a point at which the beetles can no longer produce broods in epidemic proportions. The second factor, and a most important one, is stand elevation. The elevation of the Irish Canyon Creek Section varies from 8,300 to 8,900 feet. Muddy Ridge is higher, ranging from 8,600 to 9,300 feet. According to Amman, et al, (1977) one criterion for predicting stand susceptibility to mountain pine beetle attacks is elevation-latitude. The average elevation for Irish Canyon Creek is 8,600', and the latitude is nearly 43°N. This combination puts the stand in the moderate-to-low category for that criterion. Average elevation for Muddy Ridge is 8,950'; and, at approximately the same latitude, its "risk" is even lower.

Obviously the mountain pine beetle can and does kill trees in these stands. The large number of beetle-killed snags attest to this fact. But these trees represent the larger diameter classes and few corresponding green trees remain. Considering the elevation-latitude of the stand, this reduction in average stand diameter has greatly reduced the susceptibility of these trees to beetle attack.

RECOMMENDATIONS

1. Direct control measures against the beetle, chemical or silvicultural, are neither necessary nor recommended at this time.

2. Provided markets are available, standing dead trees should be removed while still useable.

3. Overstocked stands of small (4-8") diameter trees should be thinned to improve overall stand vigor and help reduce ultimate losses to insects and diseases.

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REFERENCES

Amman, G. D., M. D. McGregor, D. B. Cahill, and W. H. Klein. 1977. Guidelines for reducing losses of lodgepole pine to the mountain pine beetle in unmanaged stands in the Rocky Mountains. USDA, Forest Service, General Technical Report. INT-36. 20 pp.

APPENDIX

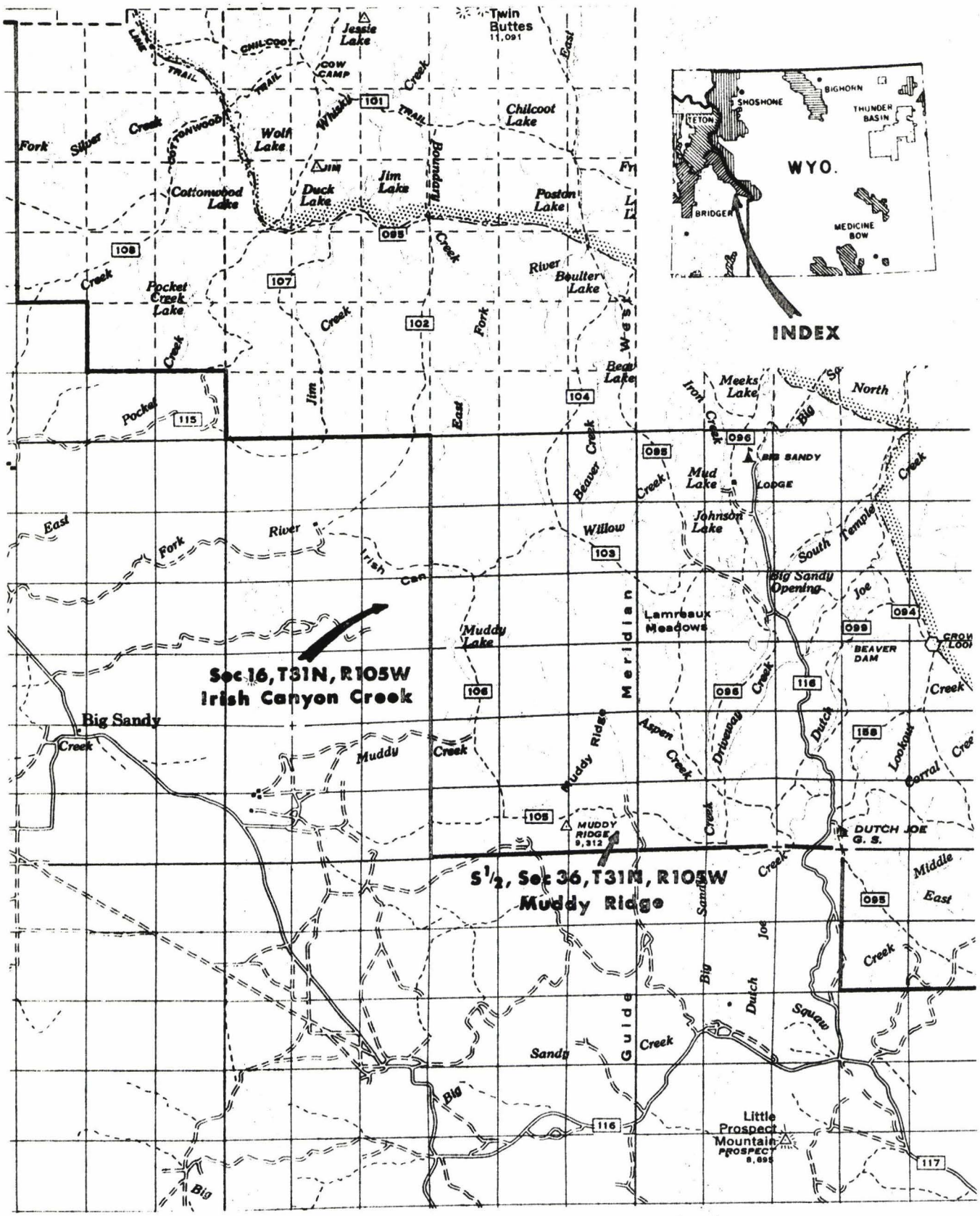
Twin Buttes 11,091
Jessie Lake
Chilcoot Lake
Wolf Lake
Duck Lake
Jim Lake
Poston Lake
Cottonwood Lake
Pocket Creek Lake
Boulter Lake
Bear Lake
Meeks Lake
Mud Lake
Johnson Lake
Lamreaux Meadows
Muddy Lake
Big Sandy Opening
BIG SANDY LODGE
BEAVER DAM
DUTCH JOE G. S.
MUDDY RIDGE 9,312
Little Prospect Mountain PROSPECT 8,695
Sec 16, T31N, R105W
Irish Canyon Creek
S½, Sec 36, T31N, R105W
Muddy Ridge
Big Sandy Creek
Muddy Creek
Irish Can
East Fork River
Pocket Creek
Jim Creek
Beaver Creek
Willow Creek
Iron Creek
Big Sandy North
Big Sandy South
Temple Creek
Muddy Ridge
Aspen Creek
Driveway Creek
Dutch Creek
Lookout Creek
Corral Creek
Middle Fork Sandy Creek
Big Dutch Joe Creek
Squaw Creek
Big Sandy Gulde Creek
Meridian
West Fork Jim Creek
East Fork Jim Creek
Whiskey Trail
Chilcoot Trail
Cow Camp Trail
Cottonwood Trail
Boundary Creek
Slipper Fork Creek
Pocket Creek
Jim Creek
Beaver Creek
Willow Creek
Iron Creek
Mud Creek
Temple Creek
Aspen Creek
Driveway Creek
Dutch Creek
Lookout Creek
Corral Creek
Middle Fork Sandy Creek
Big Dutch Joe Creek
Squaw Creek
Big Sandy Gulde Creek
Big Sandy Creek
Muddy Creek
Irish Can
East Fork River

TABLE 1 - Irish Canyon Dead
Lodgepole Pine - Trees Per Acre

DBH	1978 Attacks	1977 Attacks	1977 Strips	Snags	Total Dead
6	0	0	0	0.250	0.250
7	0	0	0	2.000	2.000
8	0.250	0	0.125	5.125	5.375
9	0	0	0	6.125	6.125
10	0	0	0.125	5.500	5.500
11	0	0	0	4.375	4.375
12	0	0.125	0	2.625	2.750
13	0.125	0	0	1.875	2.000
14	0.125	0.125	0	1.250	1.500
15	0	0	0	0.875	0.875
16	0	0	0	0.250	0.250
17	0	0	0	0.625	0.625
18	0	0	0	0.125	0.125
Total	0.500	0.250	0.250	31.000	31.750

TABLE 2 - Irish Canyon Green Stand
Trees Per Acre

DBH	Lodgepole Pine	Aspen	Total
6	66.845	3.183	70.028
7	74.835		74.835
8	64.458	1.790	66.248
9	35.368	2.829	38.197
10	13.751		13.751
11	7.576		7.576
12	5.570		5.570
13	2.034		2.034
14	2.339		2.339
15	1.528		1.528
16	0.448		0.448
17	0.793		0.793
18	0.354		0.354
Total	275.899	7.802	283.701

TABLE 3 - Muddy Ridge Dead
Lodgepole Pine - Trees Per Acre

DBH	1978 Attacks	1977 Attacks	1977 Strips	Snags	Total Dead
6	0	0	0	0.200	0.200
7	0	0	0	0.800	0.800
8	0	0	0	2.600	2.600
9	0	0	0	2.400	2.400
10	0	0	0	4.400	4.400
11	0	0	0	3.800	3.800
12	0	0	0	2.400	2.400
13	0	0	0	2.200	2.200
14	0	0	0	1.200	1.200
15	0	0	0	0.800	0.800
16	0	0	0	1.400	1.400
17	0	0	0	0.800	0.800
18	0	0	0	0.400	0.400
19	0	0	0	0.200	0.200
21	0	0	0	0.200	0.200
22	0	0	0	0.400	0.400
23	0	0	0	0.600	0.600
25	0	0	0	0.200	0.200
Total	0	0	0	25.000	25.000

TABLE 4 - Muddy Ridge Green Stand
Trees Per Acre

DBH	Lodgepole Pine	Aspen	Total
6	50.930	15.279	66.209
7	33.676	14.967	48.643
8	20.054	11.459	31.513
9	13.581	4.527	18.108
10	1.833	5.500	7.333
11	9.092	3.031	12.123
12	2.546	0	2.546
13	2.170	0	2.170
14	0.935	0	0.935
16	1.432	0	1.432
18	0	0.566	0.566
Total	136.249	55.329	191.578